



Armed Forces College of Medicine AFCM





Histological Structure of the Pancreas

Dr. Hanan A. Saleh

Prof. of Histology & Cell Biology



Pancreas



ILOs:

- Describe the structure of the exocrine part of the pancreas.
- Correlate the structure of the exocrine pancreas to its function.
- Compare between the structure of the parotid gland and the pancreas.



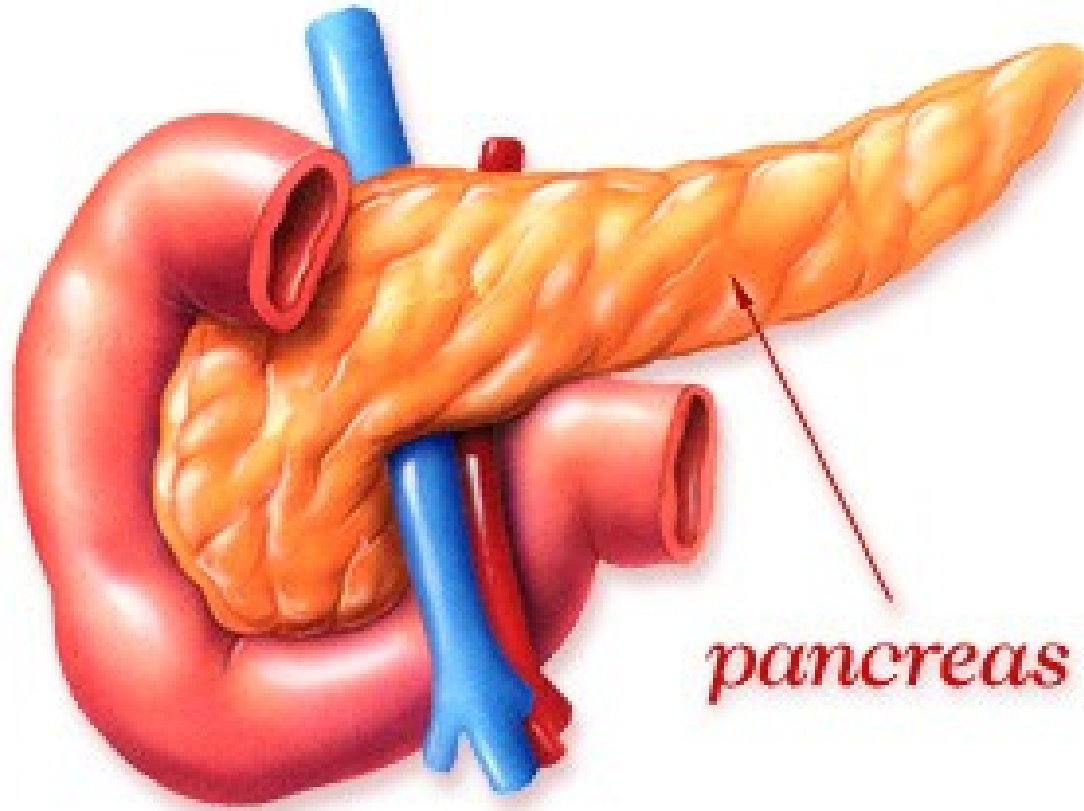
Pancreas



- **Key Points:**
 - Microscopic structure of exocrine pancreas
 - Structure/ function relationship of exocrine pancreas
 - Differences and similarities between pancreas and parotid glands



Pancreas



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PANCREAS

Mixed gland

2nd largest gland of the body

STROMA

PARENCHYMA

CAPSULE

TRABECULAE

RCT

EXOCRINE PART

ENDOCRINE PART

SECRETORY UNITS

DUCT SYSTEM

PANCREATIC ACINI

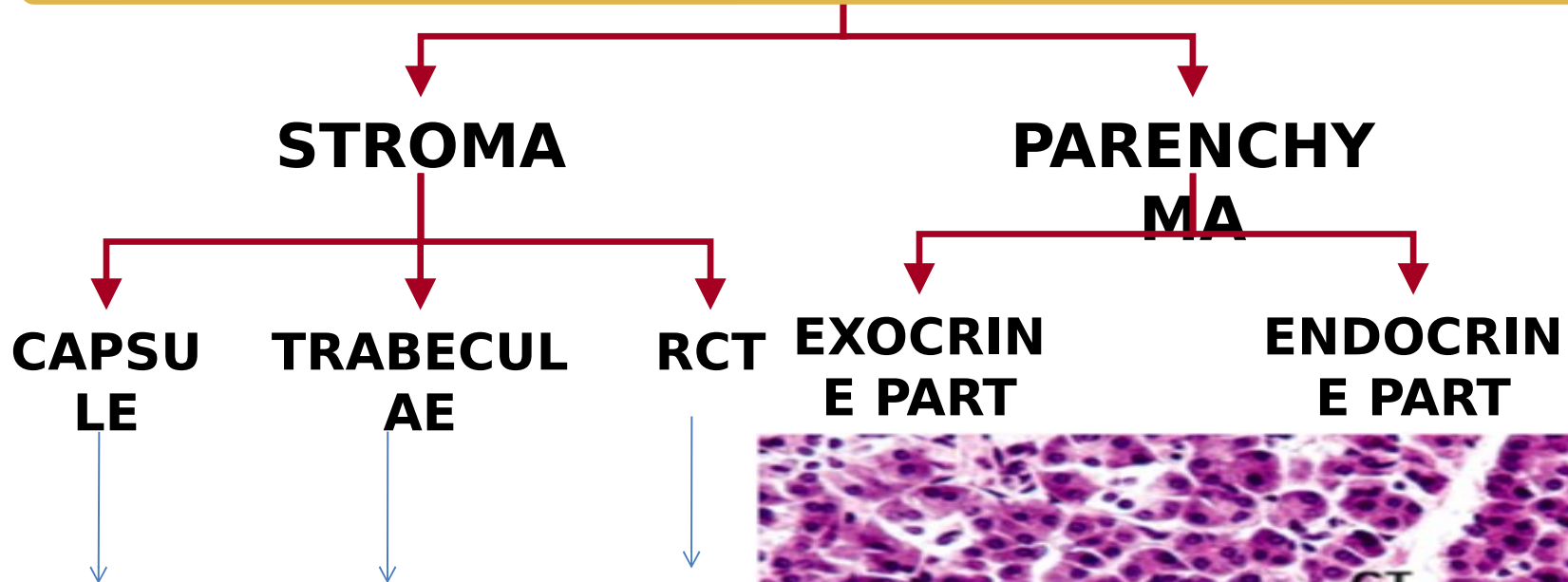
Digestive enzymes

ISLETS OF LANGERHANS

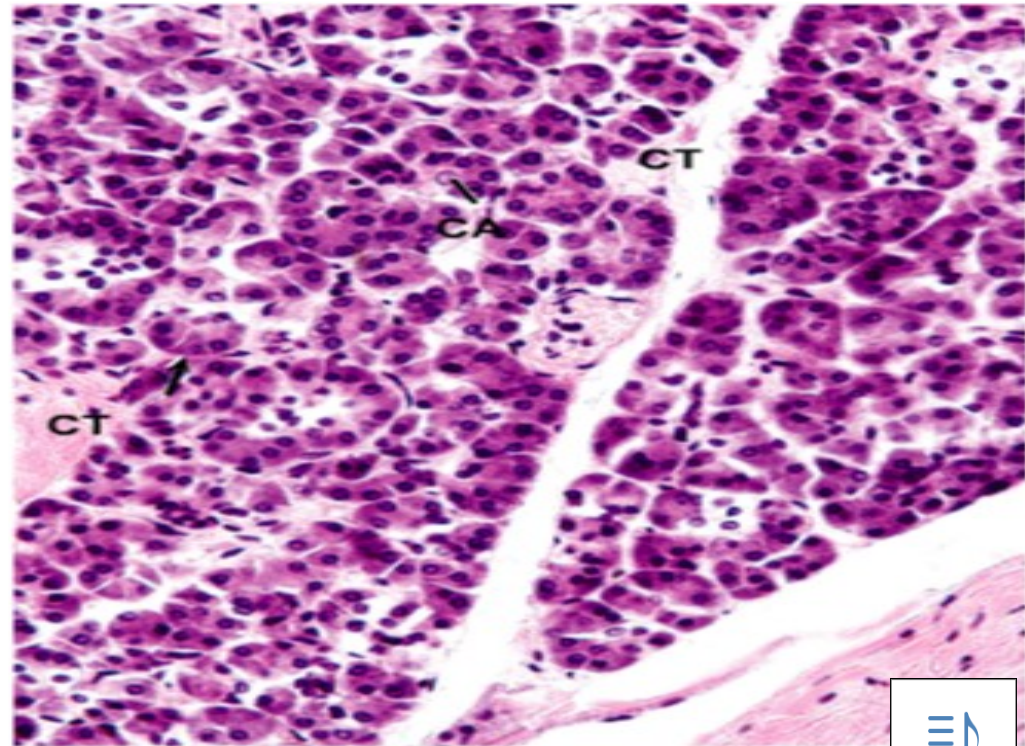
hormones



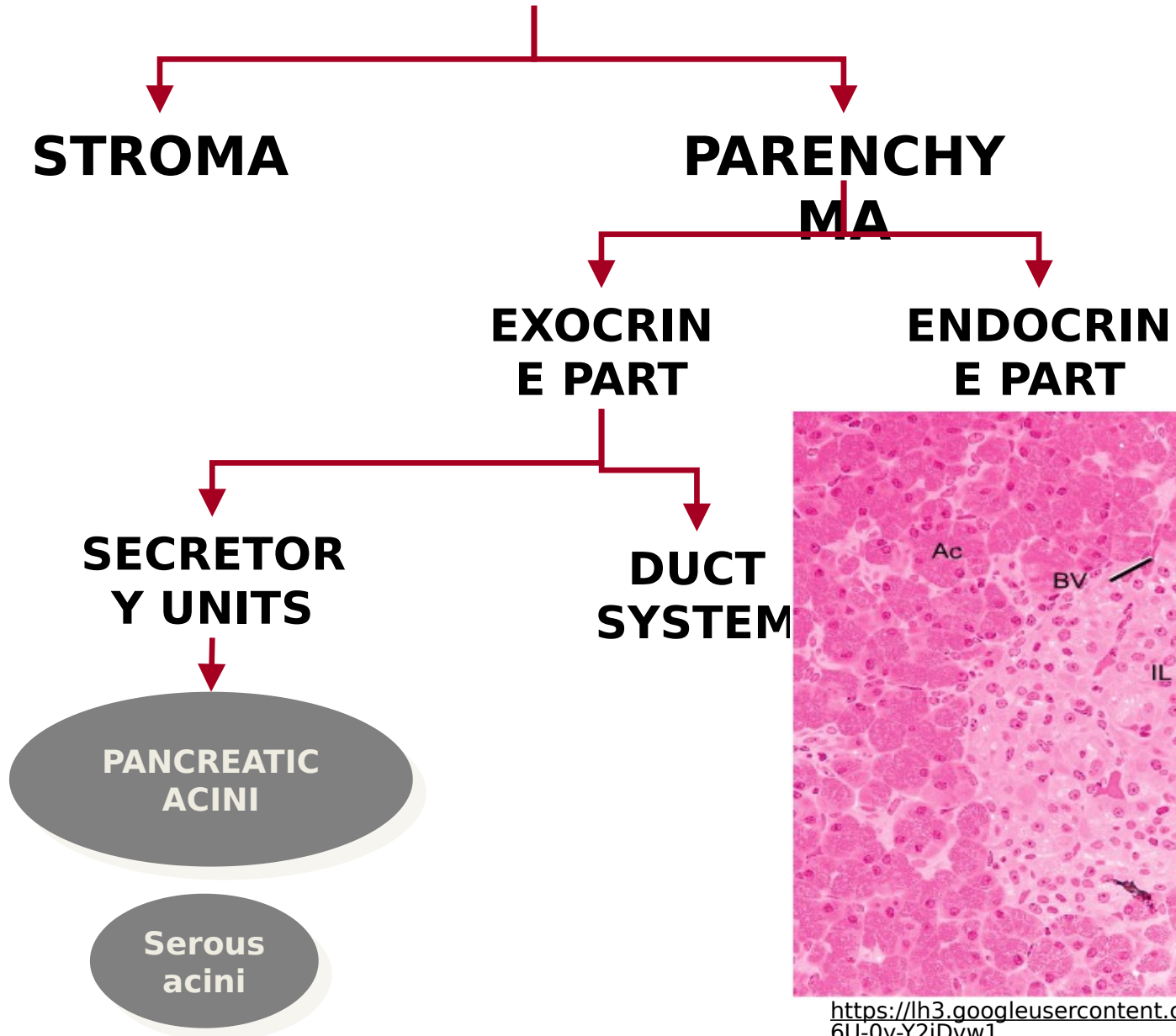
Pancreas



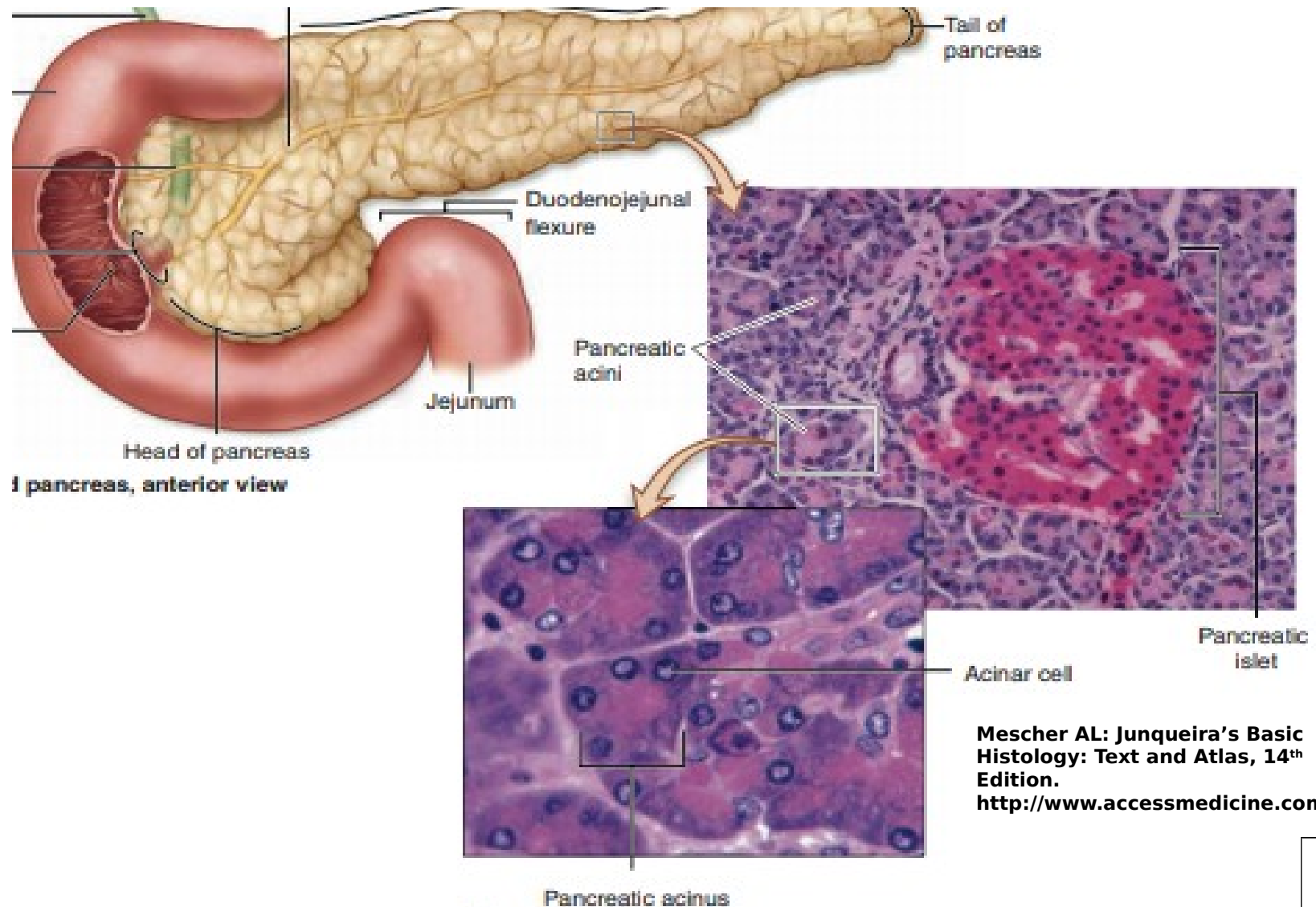
Thin &
delicate



Pancreas



Pancreas

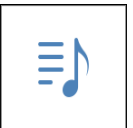


Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>



Which of the following best describes the stroma of the pancreas?

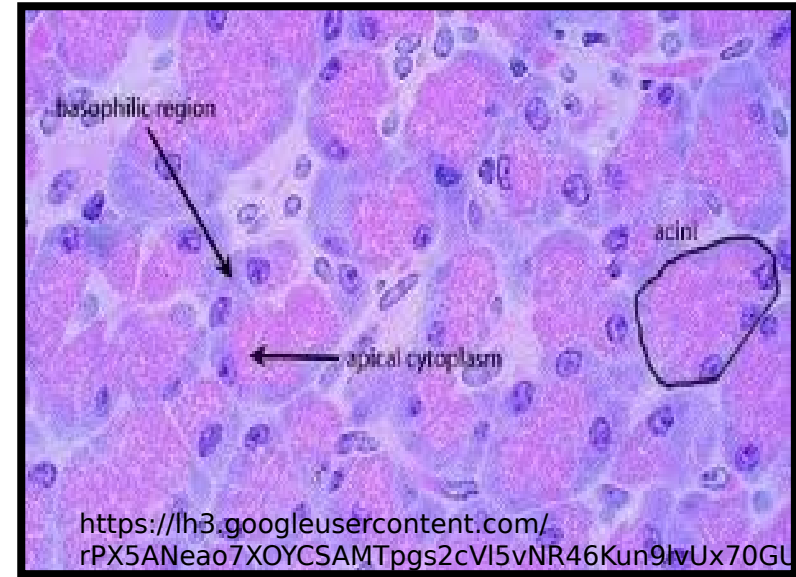
- ☒ a. It contains numerous elastic fibers
- b. It is thin and delicate
- c. It is thick and coarse
- d. It contains many fat cells



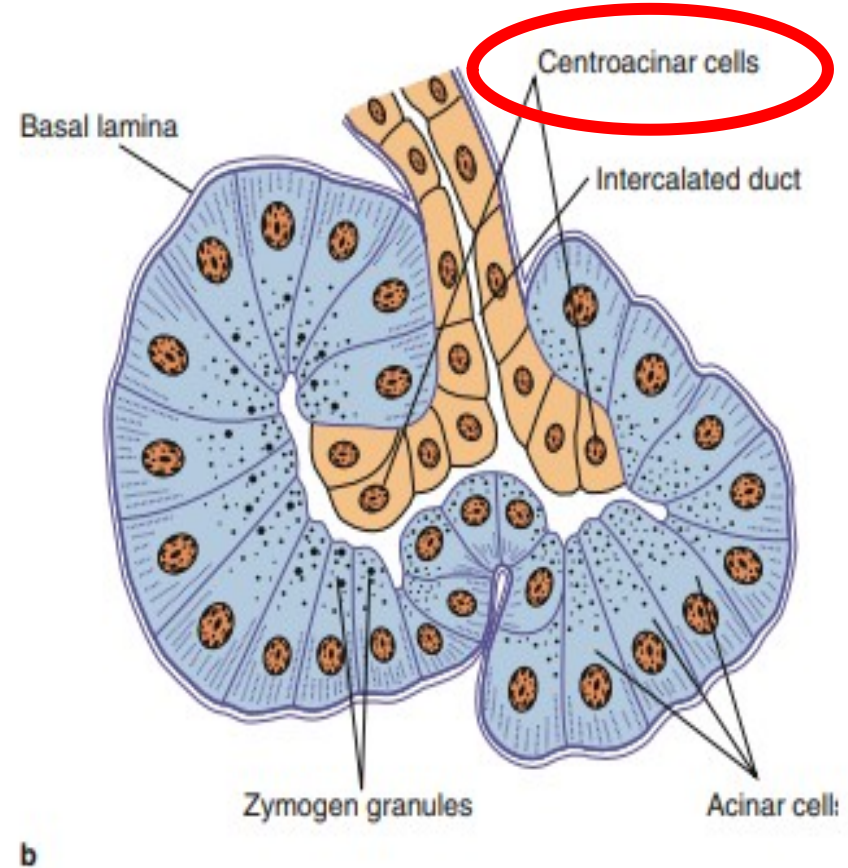
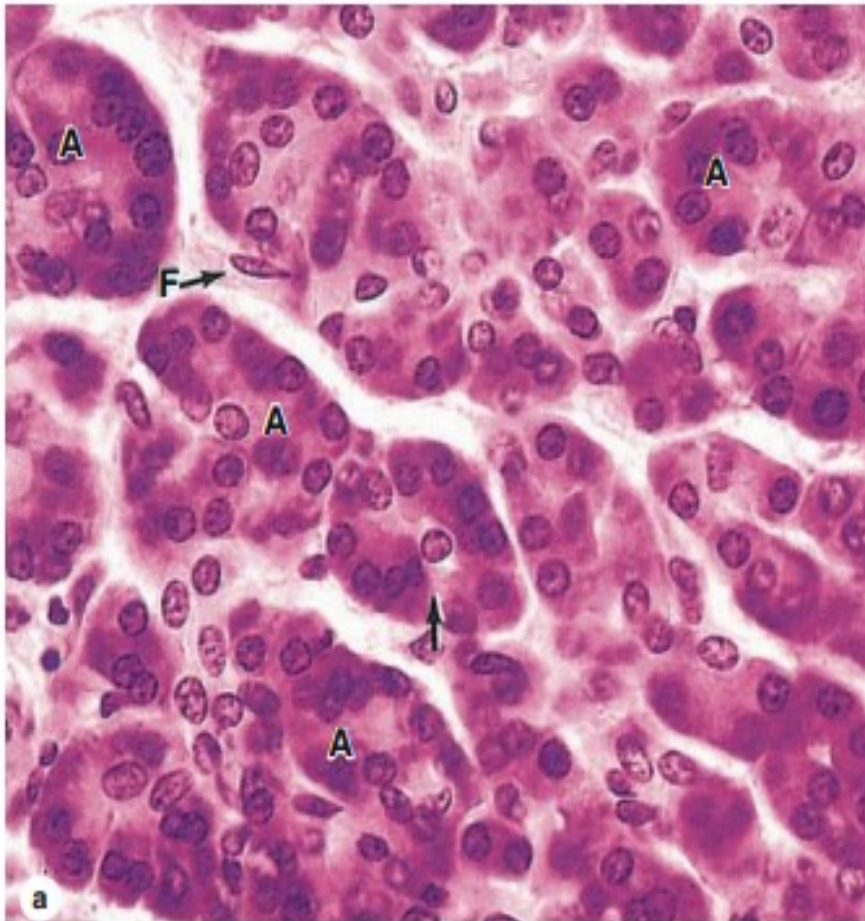
Exocrine Pancreas



- **Serous acini**
- **Pyramidal cells arranged around a central lumen.**
- **Nucleus is spherical, basal & vesicular.**
- **Cytoplasm: basal basophilic striations.**
- **Apical acidophilic large zymogen granules**
- **The lumen contains centroacinar cells**
- **No myoepithelial cells**



Exocrine Pancreas



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>



Exocrine Pancreas

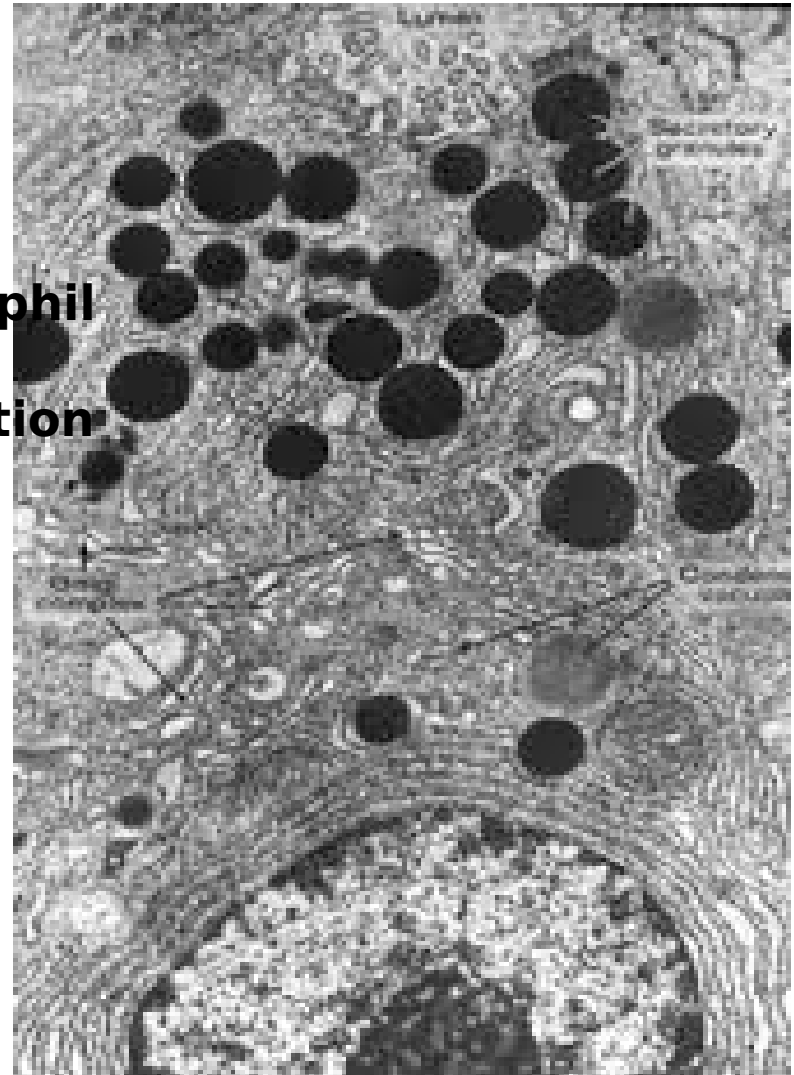


Serous acini

EM:

- Basal rER.
- Elongated basal mitochondria.
- Supranuclear well developed Golgi apparatus.
- Apical zymogen granules (inactive enzymes).
- Junctional complexes between acinar cells???

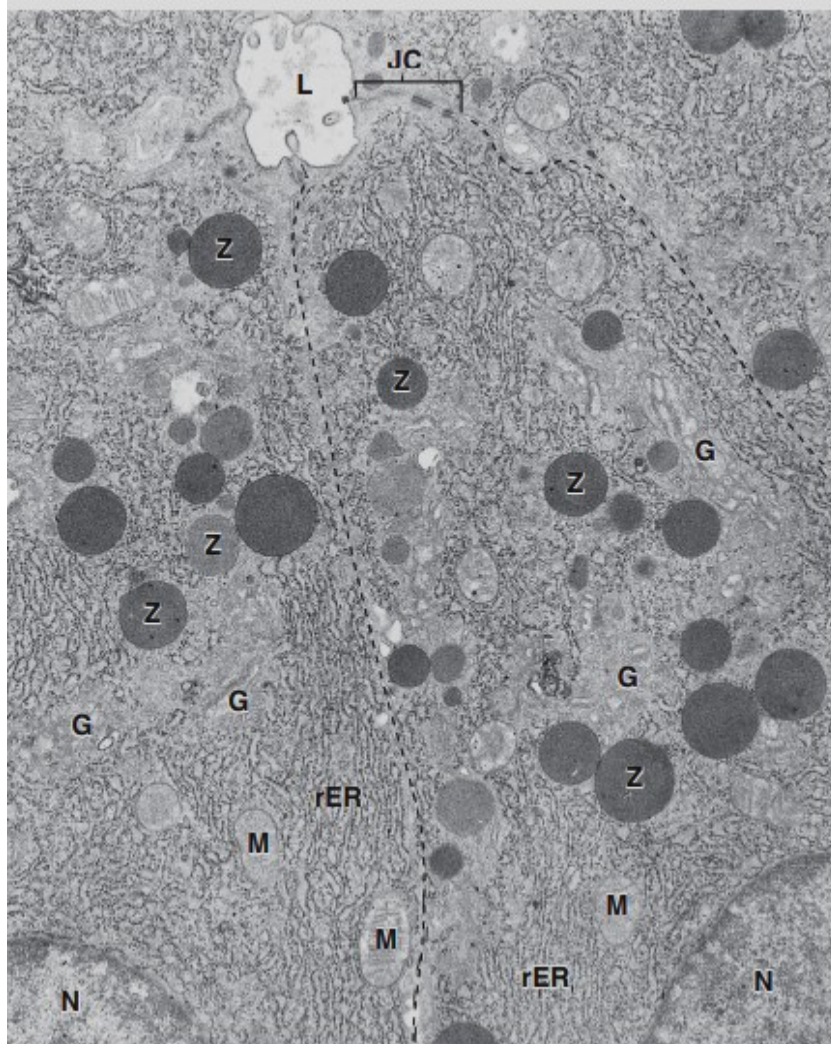
Basophilic striation



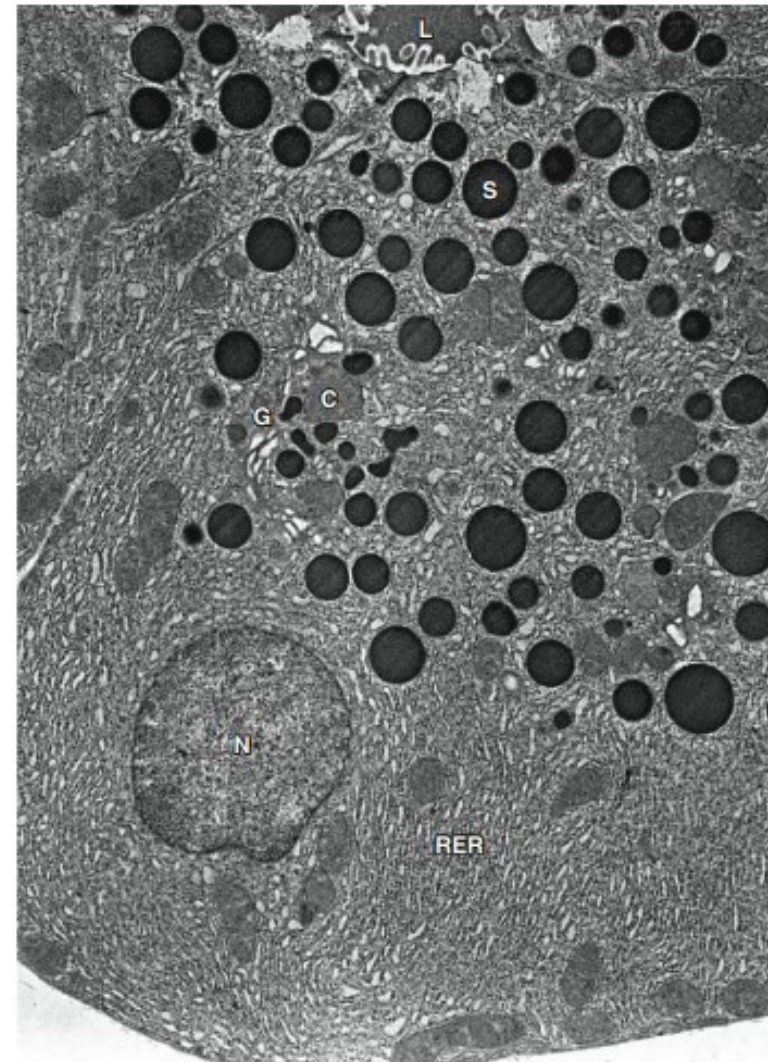
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Exocrine Pancreas



Ross MH, Pawlina W: Histology A Text & Atlas with correlated Cell & Molecular Biology, 6th Edition.



Mescher AL: Junqueira's Basic Histology: Text and Atlas, 12th Edition
<http://www.accessmedicine.com>



Lecture quiz

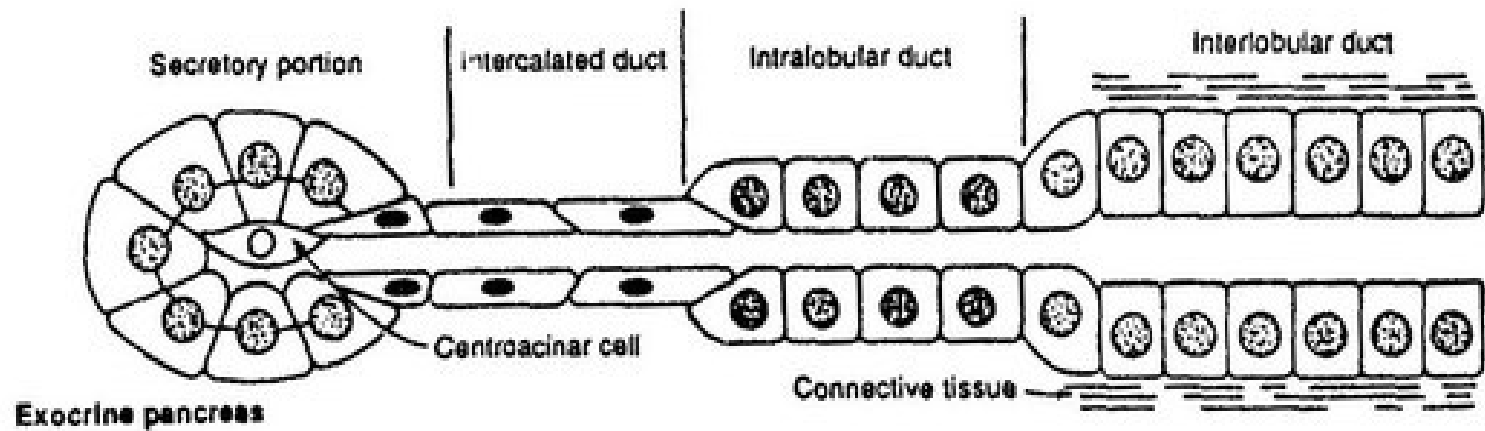


Which of the following is a characteristic feature of pancreatic acinar cells?

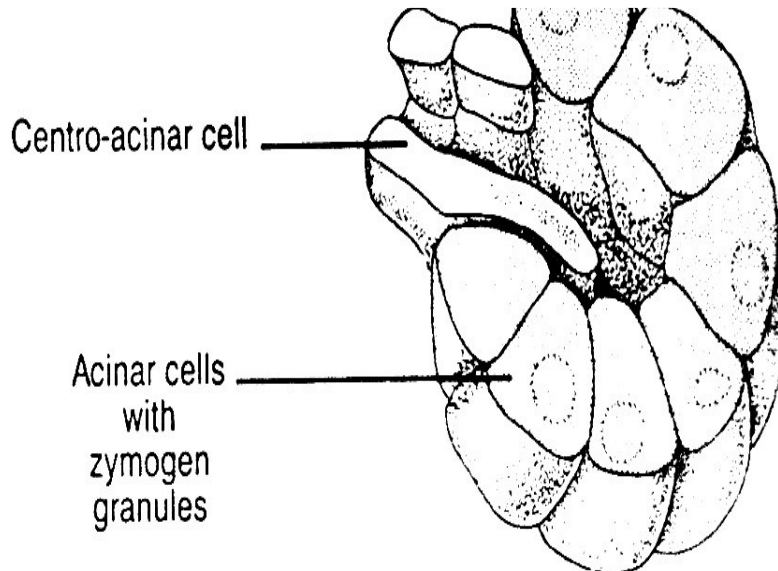
- a. Numerous SER
- b. Many lysosomes
- ☒ c. Prominent Golgi apparatus
- d. Basal granules.



Exocrine Pancreas



SECRETORY UNITS



DUCT SYSTEM

Centro-acinar cells

Intercalated duct

Intralobular duct

Interlobular duct

Main pancreatic duct

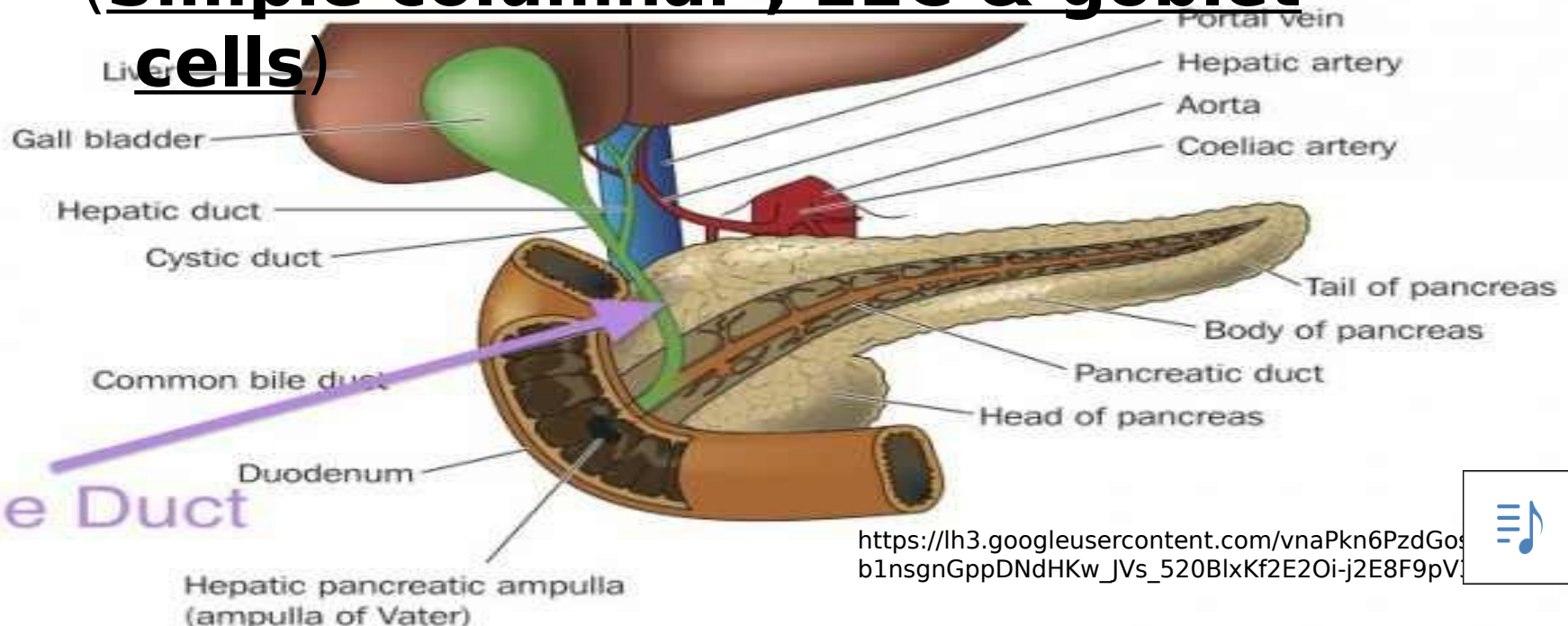
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The Duct System



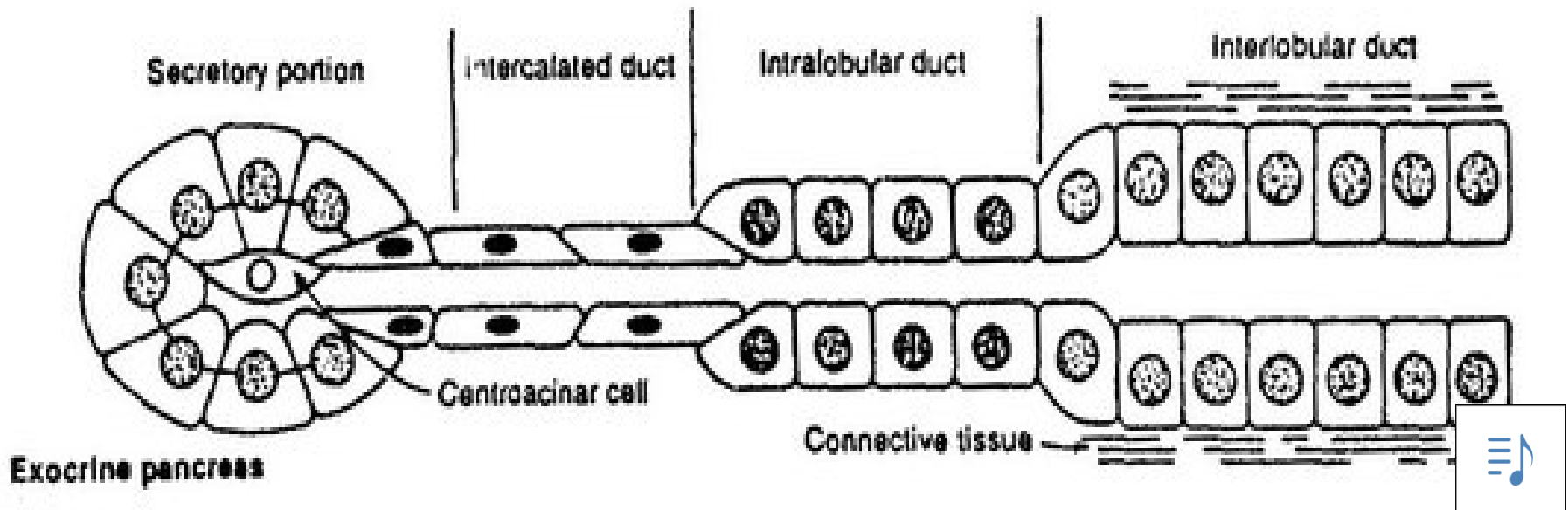
- **Centro acinar cells**
- **Intercalated ducts**
- **Intralobular collecting duct.**
- **Interlobular ducts**
- **Main & Accessory Pancreatic ducts**
(Simple columnar , EEC & goblet cells)



Exocrine Pancreas (Function)



- Secretion of amylase, lipase, ribonuclease and elastase.
- Secretion of proenzymes: trypsinogen and chemotrypsinogen. (activated after reaching the duodenum)
- Bicarbonate rich buffer solution.



Exocrine Pancreas



Q:Protection against autodigestion of pancreas????

1-pancreatic enzymes are stored in inactive forms & activated only in the duodenal mucosa by **enterokinase**

2-Cytoplasm of **acinar** cells contains **trypsin inhibitor**



Exocrine Pancreas (Function)

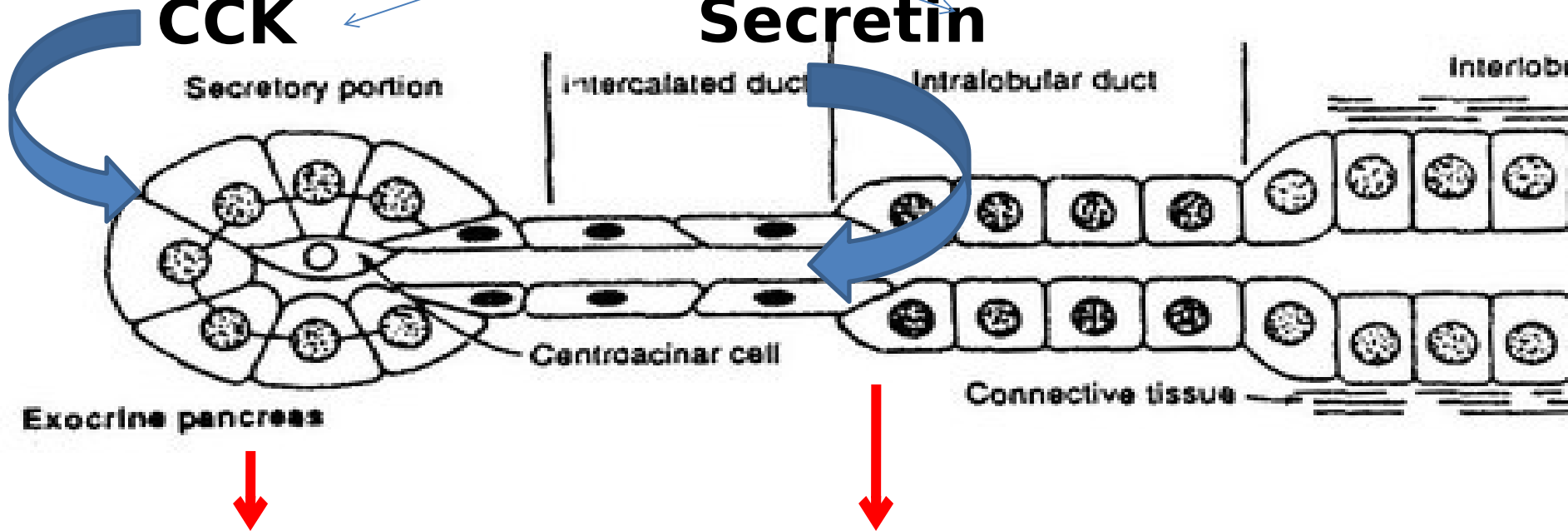


- Secretion of pancreatic enzymes is under **nervous** and **hormonal** control:

- Para-sympathetic stimulates secretion.
- Hormonal control: from intestinal **enteroendocrine** cells:

CCK

Secretin



**Enzyme
rich**

**Bicarbonate
rich**



PANCREAS

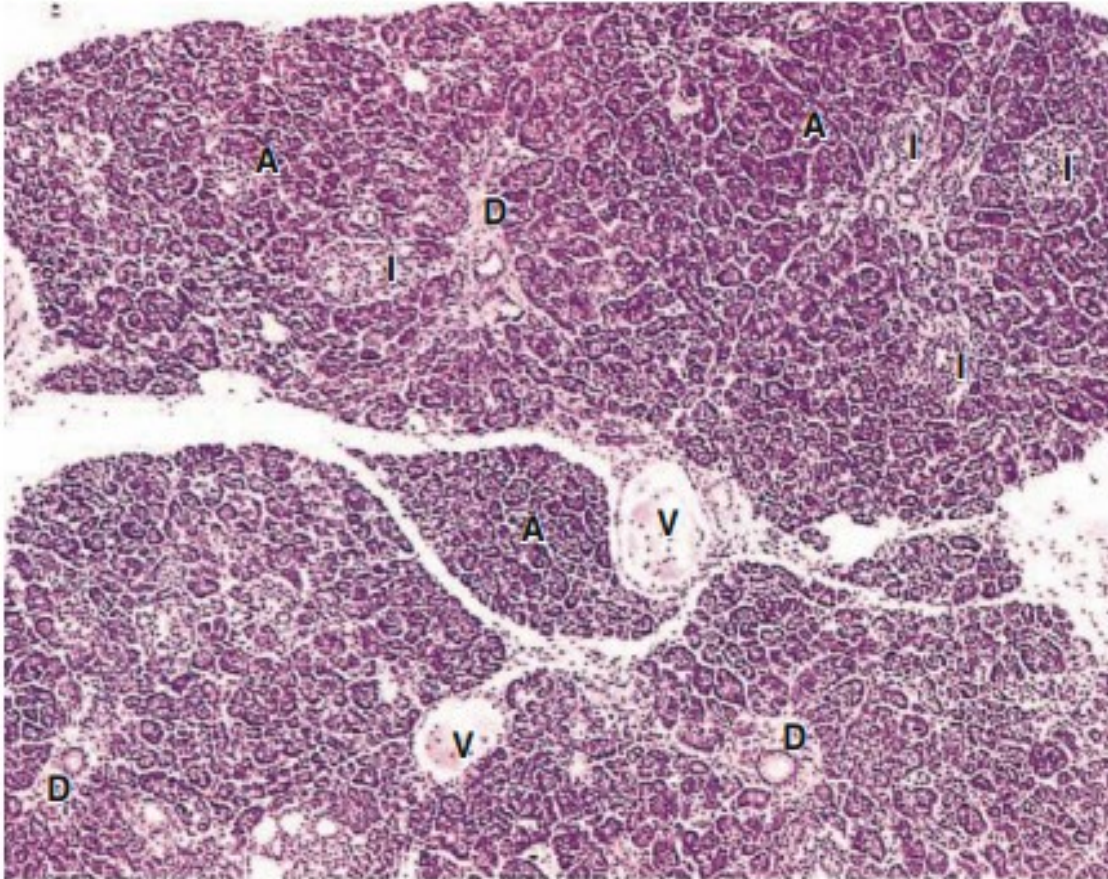
PAROTID



Capsule	Thin	Thick
Trabeculae	Thin and loose	Thick and fibrous
Acini: Serous	Larger and variable shape Centro-acinar cells	Smaller and rounded Absent
Ducts	Relatively few	Numerous
Striated duct	Absent	Numerous
Main duct	Col, EEC & goblet cell	St sq.non ker.
Islets of Langerhans	Present	Absent



Exocrine Pancreas

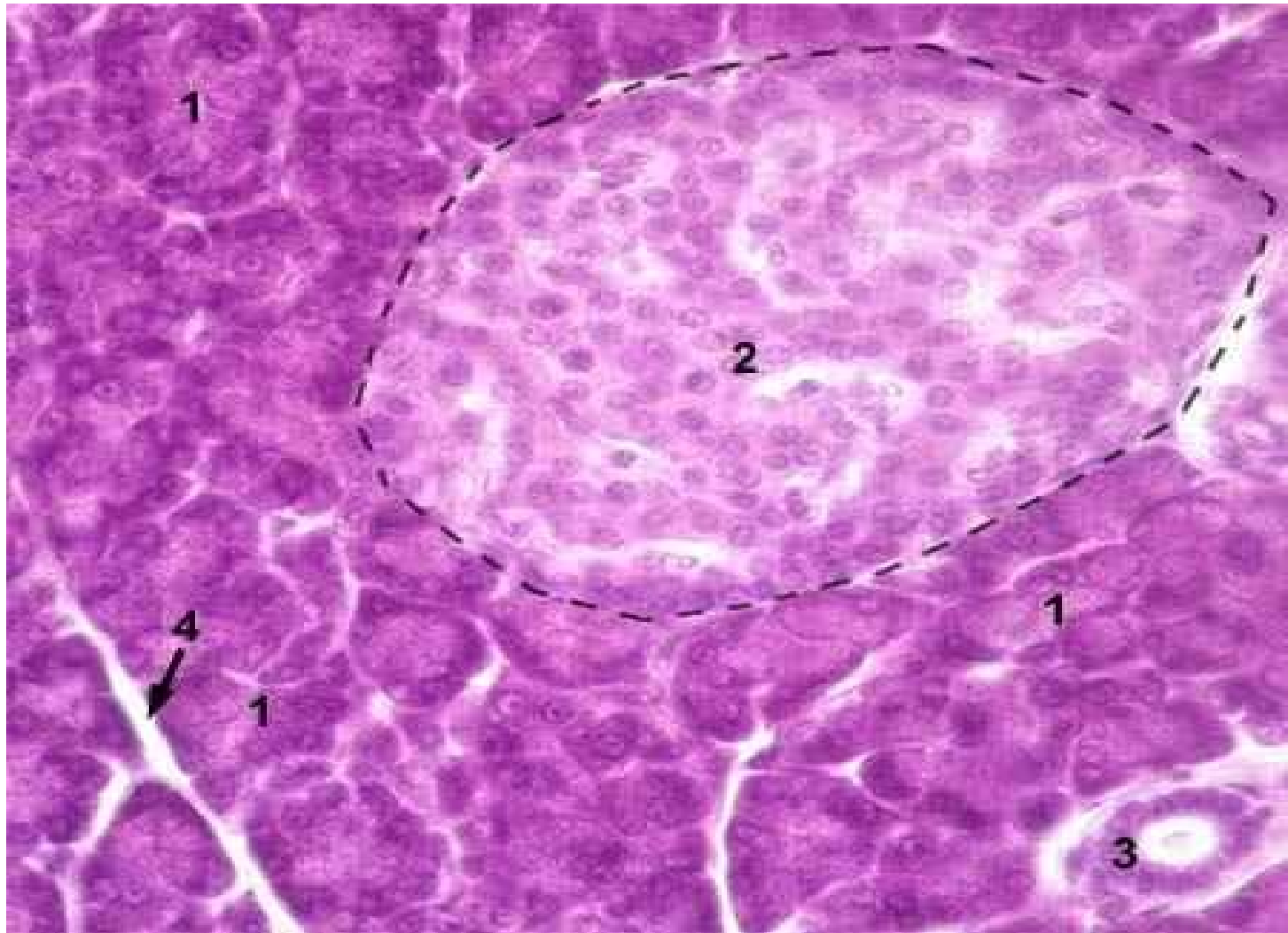


Low-power view of pancreas includes several islets (I) surrounded by many serous acini (A). The larger intralobular ducts (D) are lined by simple columnar epithelium. The ducts and blood vessels (V) are located in connective tissue, which also provides a thin capsule to the entire gland and thin septa separating the lobules of secretory acini. (X20; H&E)

Mescher AL: Junqueira's Basic Histology: Text and Atlas, 14th Edition.
<http://www.accessmedicine.com>



Pancreas



https://www.google.com.eg/url?sa=i&source=images&cd=&ved=2ahUKEwifsKa1y_TIAhUmz40AjQQjRx6BAgBEAQ&url=https%3A%2F%2Fwww.pinterest.co%2Fpin%2F369928556873825738%2F&psig=AOvVaw01I2yA



Medical Application

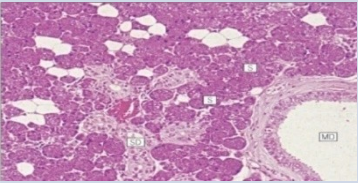
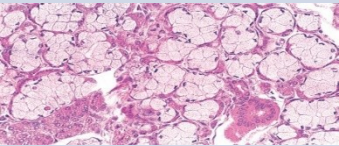
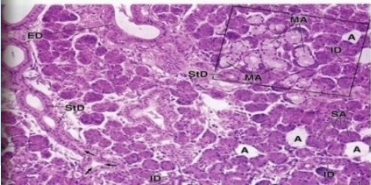
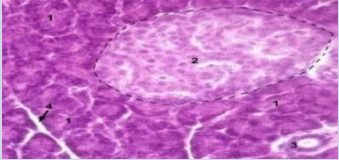


Acute pancreatitis:

The proenzymes may be activated and digest pancreatic tissues, leading to very serious complications. Possible causes include infection, gallstones, alcoholism, drugs, and trauma.

—



	parotid	Sublingual	submandibular	Pancreas
Secretory acini	Pure serous 	predominantly mucous 	predominantly serous 	Pure serous but larger acini 
Centro-acinar cells	Absent	Absent	Absent	Present
Intercalated duct function	Stem cells	Stem cells	Stem cells	Secretin ---- bicarbonate rich fluid
Striated duct	Numerous	Numerous	Numerous	Absent
Main duct	stratified columnar epithelium. The distal end is lined with ☐ non-keratinized stratified squamous epithelium			Col, EEC & goblet cell
Myoepithelial cells	Less Numerous	Numerous	Less Numerous	Absent 

Question



Which of the following best differentiates the pancreas from the parotid gland?

- a. Numerous serous acini
- b. Few mucous acini
- ☒ c. Absent striated ducts
- d. Formed of lobules



Summary



The pancreas is a mixed gland.

The exocrine pancreas is formed of serous and ducts

The duct system is formed of centro acinar cells, intercalated ducts, intralobular collecting duct, interlobular ducts and main & accessory Pancreatic ducts



Pancreas



- **Key Points:**
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Suggested textbooks



- 1- Junqueira`s Basic Histology; Text and Atlas. 14th edition 2016, pp: 332.
- 2- Histology atlas and test: Michael H. Ross and Wojciech Pawlina, 7th edition, 2015, pp: 553



**Thank
you**

